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A NOVEL APPROACH IN AGRICULTURE AUTOMATION FOR SUGARCANE FARMING BY HUMAN ASSISTING CARE ROBOT

S. SARAVANAN, S. S. ARAVİNTH & M. RAMESHKUMAR

Dhirajlal Gandhi College of Technology, Salem, Tamil Nadu, India

ABSTRACT

Agriculture is the back bone of the Universe. Many countries in the world depend on Agricultural products. Conventionally, basic robots like fruit picking, flower plucking robots are used. The application of robotics in the agriculture field is slowly increasing. In sugarcane planting and monitoring field, farmers are facing challenges like scarcity of skilled farmers, irrigation, scratches of leaf blades and continuous monitoring of water level for the sugarcane. In this proposed system, the robot itself can plant the sugarcane set and monitors the Sugarcane field. Thus, it overcomes the difficulties in existing system. For implementation, the Fire Bird V robots are used.

KEYWORDS: Monitoring Field, Farmers are Facing & The Fire Bird

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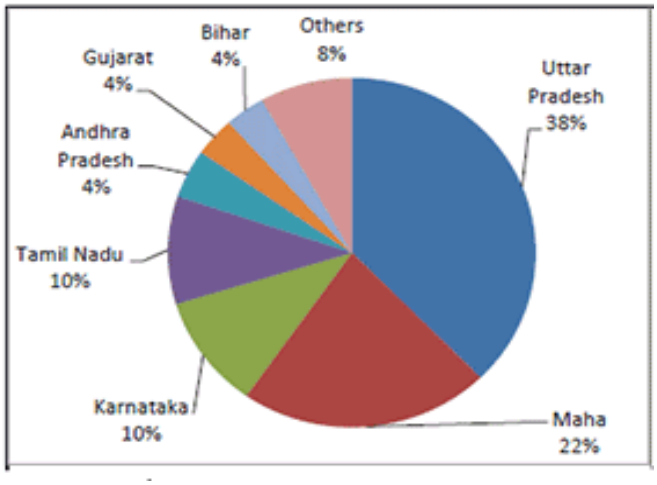
Original Article

INTRODUCTION

India is one of the leading countries in sugarcane production in the world. Especially in Maharashtra, the leading state in sugarcane production, farmers are facing many problems from the practical time of seeding of sugarcane such as scarcity of sufficient workers at the time of seeding; paying of wages for workers is not economical. Not only in planting, but also in monitoring of sugarcane arena, farmers want to face many challenges in continuous maintenance of the sugarcane area during day and night time.



Analysis 1: State Wise SC Cultivation

State	Area (in ha)	Production (in'000 tonnes)	Productivity (tonnes/ha)
Andhra Pradesh	200	115533	77.7
Assam	25	935	37.4
Bihar	108	4352	40.3
Chhattisgarh	10	29	29.0
Gujarat	197	14304	72.6
Haryana	115	8050	70.0
Jharkhand	6	150	25.0
Karnataka	210	17357	82.7
Kerala	1	108	108.0
Madhya Pradesh	96	4075	42.4
Maharashtra	770	57042	74.1
Orissa	18	1117	62.1
Punjab	105	6300	60.0
Rajasthan	8	475	59.4
Tamil Nadu	323	35182	108.9
Uttar Pradesh	2058	120140	58.4
Uttarakhand	124	7686	62.0
West Bengal	20	1300	65.0

Analysis 2: State Wise SC Production and Productivity

As per the analysis, the manual cultivation engages more time and manpower. Using robot assisted cultivation approach; the above mentioned challenges are resolved. And also this method improves the production and productivity of the sugarcane yield.

At the time of irrigation, farmers are subjected to injuries made by both leaf blades and animals. For the above mentioned difficulties, day by day, the solutions are being given. But, those solutions are not satisfied for the agricultural field to the expected level. Normally, robots are not used in sugarcane planting and monitoring field. The proposed novel idea will use robots to resolve such type of scarcity skilled farmers, scratches of leaf blades and continuous monitoring of the field. This proposed system will make the benefits to farmers and as well agriculture field.

IMPLEMENTATION

The sugarcane farming care robot system will be implemented in the different stages as follows.

Stage 1

For implementing the proposed system, we are going to consider the arena which is mentioned below. The arena consists of nine slot location where the planting of sugarcane is taking place. The distance between the slots is very minimal. As well the considered arena has the black line as per the arena set up by which the robot will travel the entire slots by following the black line follower from IN position to the OUT position. The water level of the sugarcane land is also considered.

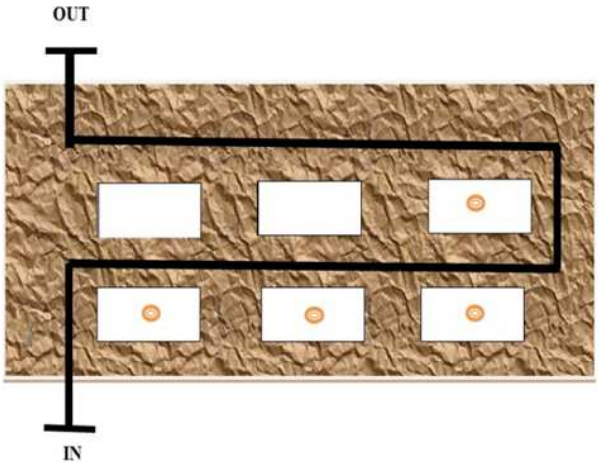


Figure 1: The Arena Design

Stage 2

The Firebird robot consists of an arm with a gripper arrangement of planting the seed and as well for water level indication in a sugar cane field. The diagram is shown in Figure 2(a). In the implementation of the proposed system, the robot has to start its traverse from the IN position of the arena. Once the robot has started, it will follow the black line. After sensing, the slots are to be filled with sugarcane seed by using the arm with gripper arrangement. The same process can be followed by the robot for the remaining slots by traversing the black line on the arena. The planting process of the sugarcane is depicted in the Figure 2(b).

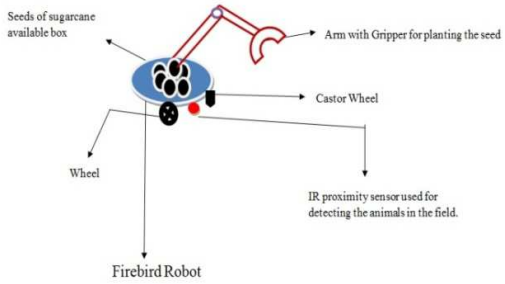


Figure 2(a)

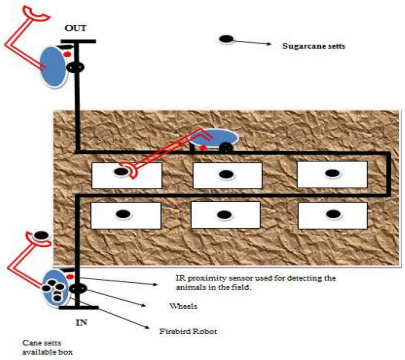


Figure 2(b)

Stage 3

This system is also focusing to monitor the insects in the Sugarcane farm land. The monitoring of the insects can be done by the IR sensor. The insect monitoring information is indicated through a buzzer sound.

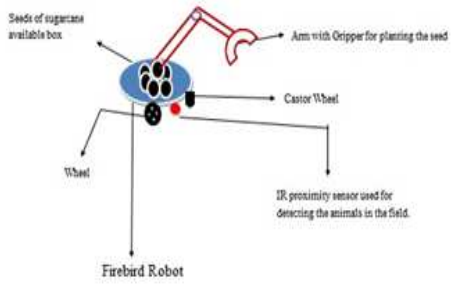


Figure 3(a)

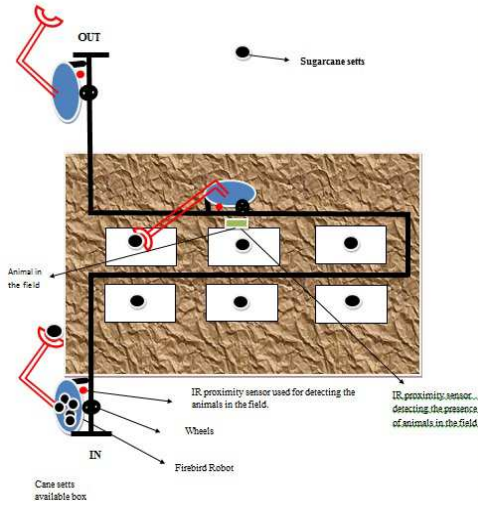


Figure 3(b)

Screenshots of Working Model

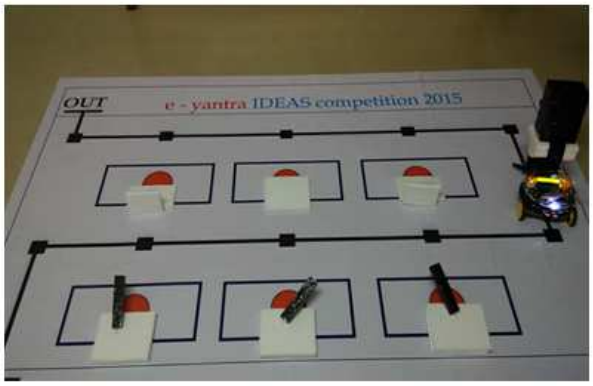


Figure 4

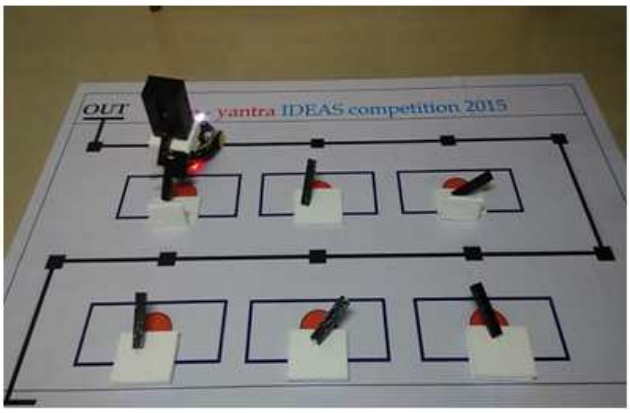


Figure 5

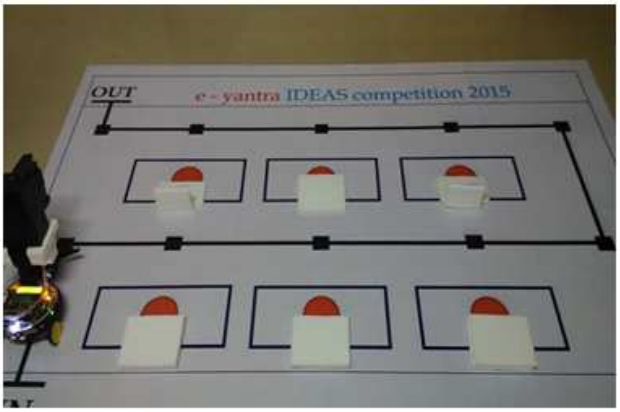


Figure 6

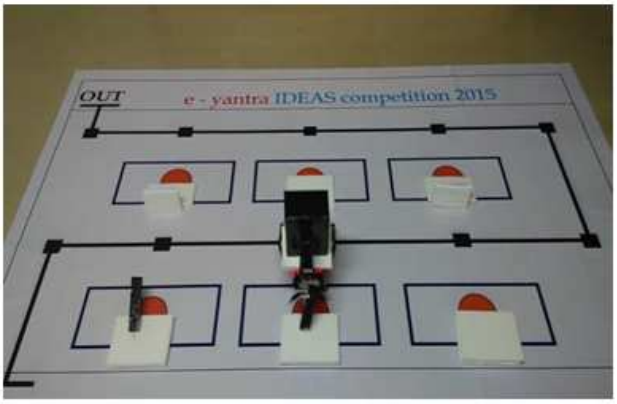


Figure 7

FEASIBILITY

The proposed idea can be implemented practically, so that the sugarcane planting and monitoring of water level of the land is possible. The robot is designed with chain roller, so that it can be used for any type of land surface. Due to heavy wind sugarcane stalk may fall on robot path, it disturbs the robot roaming. Same arm setup is utilized for planting of sugarcane and to remove the sugarcane stalk on robot path while monitoring. In reality, irrigation drip pipe can be used as a

line follower for robot movement.

CONCLUSION

After the advent of embedded sensors, **t**he IOT based agriculture models are increased recent days. More human being assisting robots are deployed in smart home appliances and smart crop yielding approaches. The use of Information and Communication Technology in the agriculture is called e Agri. Many data mining algorithms are also developed to predict the agriculture droughts. In the future, artificial robots will be used for the betterment of agriculture development. Humanoid robots such as Lego robots are used for fertilizing and harvesting purposes.

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